

GCSE



**Principal Moderator's Report**  
**Engineering and**  
**Manufacturing**

Summer Series 2018





## Foreword

This booklet outlines the performance of candidates in all aspects of CCEA's General Certificate of Secondary Education (GCSE) in Engineering and Manufacturing for this series.

CCEA hopes that the Chief Examiner's and/or Principal Moderator's report(s) will be viewed as a helpful and constructive medium to further support teachers and the learning process.

This booklet forms part of the suite of support materials for the specification. Further materials are available from the specification's microsite on our website at [www.ccea.org.uk](http://www.ccea.org.uk).



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# GCSE ENGINEERING AND MANUFACTURING

## Principal Moderator's Report

### Assessment Unit 1      Design (Controlled Assessment)

In the first year of the new specification, centres offered a diverse range of responses to the go-kart and garden kneeler design opportunities presented in pre-release material. The centres presented the work in a suitable format, bound or stapled which assisted the moderation process. All centres had their candidates work clearly identified and correctly selected for the sample. Going forward it would assist the process if candidates could simply identify which section each page was being submitted for.

Many centres had taken the guidance on board from the support day in November, but it was clear that several centres adopted their own approach to addressing the criteria, which in some cases seen them struggle to access the upper mark bands. There was evidence that some centres were still addressing the old Engineering specification and had, for example, offered improvements and amendments in the final section, rather than offering a manufacturing proposal.

In the 'Analyse the design brief and research' section, candidates must provide an analysis of the design brief that identifies how they plan to address design opportunity. Research should analyse products with reference to the key features presented as design constraints in the pre-release material. Additional analysis should be presented to provide detail regarding mechanisms, components, justification of material, method of operation, safety of use and a detailed analysis and justification of the manufacturing processes for the main component parts. Overall this section was fairly well completed with a considerable number of candidates awarded a mark within Bands 3 and 4. The amount of pages presented by centres for this section varied slightly from 1 page to 3 pages. Centres need to be reminded that the material needs to be relevant to the task, succinct, organised, clear and coherent to access the top band marks. It is suggested that this can be achieved in two pages when the work is compact, well organised and structured.

In the 'specification' section, candidates should be seeking to produce a technical design specification that makes detailed reference to the criteria listed in the controlled assessment task; criteria must include definitive, measurable and justified statements that included appropriate tolerances where applicable. Specifications generally were weak and it was clear that some candidates needed further guidance towards what a specification should look like. A significant number of candidates presented statements sharing their thoughts and feelings and what the final product would look like, rather than identifying technical criteria that they must adhere to. In addition, candidates need to focus on the need for detailed reference to the criteria listed in the controlled assessment task. The need for relevant measurable criteria researched in the first section would help candidates formulate a more relevant and detailed specification. In a small number of cases there seemed to be a disconnection between the information produced in the brief and research in Section 1 and some of the specification points outlined in Section 2.

The 'generation of design concepts' section had a varied response and a significant number of centres were struggling to reach the 3rd and top mark bands in this section due to the poor graphics and communication. Some centres work lacked the technical edge expected. Concept sketches must show a breadth of quality design thinking. Sketches should be the main medium for explaining the candidates thought process, with the use of brief annotation to add clarity to concept designs. The sketches should be presented to provide detail regarding mechanisms, components, justification of materials, method of operation,

safety of use and a detailed analysis and justification of the manufacturing processes for the main component parts. Candidates should demonstrate how their concepts address the needs of the specification via the use of annotation. Some centres used colour coding very effectively in this section to highlight key points. In the second part of this section candidates were required to produce evaluations and justifications of the concepts they were to carry forward in development. On the whole this was not particularly well done and centres should be encouraging candidates to use annotation to address how the design meets the design specification.

The fourth section 'Development of chosen solution' generated a mixed response. Candidates presented some good drawings, but there was generally a lack of clear development of the proposed solutions. Good working drawings and excellent CAD work were common place, even amongst weak candidates, but unfortunately some did not optimise their marks as they did not communicate or highlight improvements and hence missed out on very achievable marks. In addition, very few candidates used a range of calculations in the development of their final solution despite this being a key point in the assessment criteria. Many centres used the recommended 3 pages for this section but many seemed to produce additional exploded CAD drawings to 'fill up the page' rather than using one of the pages to develop the concept through to a final solution. Candidates should produce 2D and 3D developments of the final design solution, detailing how it meets the requirements of the specification and highlight the development (refinements of dimensions / features highlighted due to CAD modelling) made between the 'generation of design concepts' section and this section. A final dimensioned working drawing is also essential with appropriate consideration being made to British Standards documents (BS 308 / BS 8888:2017), with drawings produced in 3rd angle with appropriate, achievable dimensions for sub-assemblies and/or full assemblies. Details and dimensions should allow an independent party to manufacture the assembly and/or sub-assemblies. Candidates should also show further consideration of the manufacturing detail suitable for production on an industrial scale.

In the final 'manufacturing proposal' section, candidates had a fragmented approach and tended to only address parts of the specification. Many candidates produced a good manufacturing proposal with reference to materials, components and production methods. In contrast a number of candidates did not produce an appropriate and detailed costing of the proposal. Some candidates produced well drawn sketches of production methods which was not required. It was also encouraging to see a number of centres considering key economic issues such as economies of scale when considering the batch production of 250. It was also evident that some centres had not taken guidance from the new specification as they had written this section to meet the old specification making proposals for future improvements. Candidates should be outlining the key characteristics of the design proposal which would make it suitable for batch production on an industrial scale. They should also provide detail of industrial production planning, including sequencing, efficiency, timing and the use of CAM/CIM/CAE. This could be appropriately presented using flowcharts, Gantt charts and a table of parts/materials. Candidates should also aim to demonstrate how they have considered and incorporated the benefits of using standardised components and produce an overall costing, taking into account materials, components and production methods. A detailed costing for a single product in comparison to the stated batch outlined is essential in this section, highlighting the advantages and disadvantages brought about as a result of the economies of scale.

With regards to spelling, punctuation and grammar the majority of the work could be described as accurate, with a good use of an appropriate form and style. A number of candidates displayed appropriate use of specialist terminology relating to their chosen brief. In conclusion, it is recommended by CCEA that teachers avail themselves of the opportunity to attend the annual agreement trial in October 2018, to familiarise themselves



with the marking standards as this will allow them to be more effective when teaching this unit. Additional support material will continue to become available on the GCSE Engineering and Manufacturing microsite.

[www.rewardinglearning.org.uk/microsites/engineering](http://www.rewardinglearning.org.uk/microsites/engineering)

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